

CLAIMS

1. A high frequency dielectric ceramics composition constituted by combining a combination of $(Zn_{1-x}M_x)TiO_3$ and $yTiO_2$ as a main component, into which one of 0~5 wt % B_2O_3 , 0~5 wt % H_3BO_3 , 0~5 wt % SiO_2-K_2O glass, 0~5 wt % B_2O_3 and SiO_2-K_2O glass, or 0~5 wt % H_3BO_3 and SiO_2-K_2O glass is added as an additive, satisfies conditions of

M is Mg, Co or Ni,

'x' is $0 \leq x \leq 0.55$ in case of Mg and 'x' is $0 \leq x \leq 1.0$ in case of Co, and

10 $0 \leq x \leq 1.0$ in case of Ni, and

$0 \leq y \leq 0.6$.

2. A high frequency dielectric ceramics composition preparation method in which material powder of ZnO , MO (in this respect, MO is MgO , CoO or NiO) and TiO_2 is weighed according to a composition range of $(Zn_{1-x}M_x)TiO_3$ and $yTiO_2$ (M is one of Mg, Co and Ni, x is $0 \leq x \leq 0.55$ in case of Mg, x is $0 \leq x \leq 1$ in case of Co, x is $0 \leq x \leq 1$ in case of Ni, and y is $0 \leq y \leq 0.6$), mixed and dried,

the dried powder is calcined at a temperature of $850 \sim 950^{\circ}C$,

the calcined powder is mixed with one of 0~5 wt % B_2O_3 , 0~5 wt %

20 H_3BO_3 , 0~5 wt % SiO_2-K_2O glass, 0~5 wt % B_2O_3 and SiO_2-K_2O glass, or 0~5 wt % H_3BO_3 and SiO_2-K_2O glass as an additive,

the mixed powder is crushed,

the crushed power is shaped,

the shaped body is fired at a temperature of 800~925°C, and
(Zn_{1-x}M_x)TiO₃ is calcined at a temperature corresponding to a region
(region II) of below a phase dissociation temperature as shown in Figure 1 to
obtain (Zn_{1-x}M_x)TiO₃ (M is Mg, Co or Ni) of a single phase of
5 rhombohedral/hexagonal crystal.

3. The method of claim 2, wherein the shaped body is made in a
manner that an aqueous solution adding a PVA binder is sprayed onto the
crushed powder to make a granule, to which a pressure is applied.

10 4. The method of claim 3, further comprises a step for maintaining
the shaped body at a temperature of 300~500°C for a predetermined time and
removing the binder.

15 5. The method of claim 2, wherein (Zn_{1-x}M_x)TiO₃ is first calcined, and
the calcined (Zn_{1-x}M_x)TiO₃ is mixed with one of 0~5 wt % B₂O₃, 0~5 wt % H₃BO₃,
0~5 wt % SiO₂-K₂O glass, 0~5 wt % B₂O₃ and SiO₂-K₂O glass, or 0~5 wt %
H₃BO₃ and SiO₂-K₂O glass as an additive, and then fired.

20 6. A high frequency dielectric ceramics composition constituted by
combining a combination (Zn_{1-a}Mg_{1-b}Co_{1-c}Ni_{1-d})TiO₃ and yTiO₂ as a main
component, into which one of 0~5 wt % B₂O₃, 0~5 wt % H₃BO₃, 0~5 wt % SiO₂-
K₂O glass, 0~5 wt % B₂O₃ and SiO₂-K₂O glass, or 0~5 wt % H₃BO₃ and SiO₂-

K₂O glass is added as an additive, satisfies conditions of

$$0 \leq a \leq 1, 0 \leq b \leq 1, 0 \leq c \leq 1, 0 \leq d \leq 1 \text{ and}$$

$$0 \leq y \leq 0.6.$$

- 5 7. Various high frequency devices such as a multilayer chip capacitor, a multilayer chip filter, a multilayer chip capacitor/inductor composite device and a module, a low-temperature sintered substrate, a resonator and a filter or a ceramic antenna, are fabricated by using the dielectric composition of claim 1.

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